UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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Refer to NMFS No:
WCRO-2023-03230

May 23, 2024

Justin Zweifel
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FTA Region 10
915 Second Avenue
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Seattle, Washington 98174-1002

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Sound Transit Operations and Maintenance Facility South Project

Dear Mr. Zweifel:

This letter responds to your December 26, 2023, request for initiation of consultation with the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA) for the Sound Transit Operations and Maintenance Facility South Project. Your request qualified for our expedited review and analysis because it met our screening criteria and contained all required information on, and analysis of, your proposed action and its potential effects to listed species and designated critical habitat.

We reviewed the Federal Transit Administration's consultation request and related initiation package. Where relevant, we have adopted the information and analyses you have provided and/or referenced but only after our independent, science-based evaluation confirmed they meet our regulatory and scientific standards. In our biological opinion below, we indicate what parts of your document(s) we have incorporated by reference and where that information is being incorporated.

We adopt by reference in this document sections 1-3 of the Biological Assessment (BA), describing adequately the Proposed Action and Action Area (section 1 includes the consultation history, a description of the proposed action, and the action area), the Status of Species and Designated Critical habitat (section 2), and the Baseline in the action area (section 3). We also adopt section 4 on effects on critical habitat and listed species.

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on May 6, 2024 (89 Fed. Reg. 24268). We are applying the updated regulations to this consultation. The 2024 regulatory changes, like those from 2019, were intended to improve and clarify the consultation process, and, with one exception from 2024 (offsetting reasonable and prudent measures), were not intended to result in changes to the Services' existing practice in implementing section 7(a)(2) of the Act. 89 Fed. Reg. at 24268; 84 Fed. Reg. at 45015.

We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this biological opinion and incidental take statement would not have been any different under the 2019 regulations or pre-2019 regulations, except we note that we have included offsetting reasonable and prudent measures in the incidental take statement (an option that was not included in the section 7 regulations prior to 2024.

The Central Puget Sound Regional Transit Authority (Sound Transit) proposes, with funding from the Federal Transit Authority, to construct a new regional operations and maintenance facility (OMF) to serve its systemwide light rail expansions, including those into South King County and Pierce County. The purpose of the proposed action is to provide increasing alternative transportation options to reduce vehicular traffic. The proposed action described in BA section 1 is incorporated here. For the convenience of the reader we summarize this section below.

BIOLOGICAL OPINION

Consultation History and Proposed Action

Prior to submitting its biological assessment, a meeting occurred on August 24, 2023 with representatives of the Federal Transit Administration and Sound Transit. NMFS was provided project information in the form of a NEPA draft/SEPA Supplemental Draft Environmental Impact Statement for the project. This draft EIS was issued with a cover letter dated September 22, 2023. In December 2023 NMFS received the BA. NMFS reviewed the materials for completeness and initiated consultation on January 2, 2024.

1. Construction and operation of a facility with the following elements:
   - Runaround tracks
   - Storage tracks sized for approximately 144 light rail vehicles
   - Maintenance building with service lanes for vehicle maintenance, repair, carwash, cleaning, painting, spare parts storage, operations, and administration
   - Yard area for outside storage
   - Building for indoor maintenance and storage of spare parts for tracks, vehicle propulsion equipment, train signals, and other infrastructure
   - Training track that includes all the track installation configurations found in the Link System
   - Link System-Wide Storage building for receiving and indoor storing all parts of the Link light rail system,
   - A traction power substation to boost the power to the overhead catenary system that powers the light rail vehicles,
   - Offices, locker rooms, lunchrooms, and other spaces for employees,
   - Employee, Sound Transit vehicle (nonrevenue vehicle), and visitor parking
   - Construction and operation of lead track connecting the OMF South facility with mainline and test tracks. The lead tracks will be on an elevated guideway. Elevated lead tracks would leave the northeast corner of the site and be approximately 600 feet long.
   - Similarly, a pair of approximately 1,030-foot-long, elevated lead tracks would leave the southeast corner of the site to access the mainline tail tracks.

2. Construction and operation of 1.4 miles of mainline track extending from the Federal Way Downtown Station to its end point at S 344th Street. In the future, this track would continue south as part of the planned Tacoma Dome Link Extension (TDLE) project. The mainline track (guideway) will include at-grade, elevated, retained fill, and retained cut segments.

3. Construction of 0.9 mile of test track running parallel and east of the mainline track (along I- 5) from S 324th Street to just south of S 336th Street. The test track will include at-grade, elevated, retained fill, and retained cut segments. Approximately 0.5 mile of access road will be constructed parallel with and on the west side of the test track.

4. Construction of permanent treatment and flow control BMPs, as appropriate, for all new and replaced impervious surfaces.

5. Roadway improvements including replacements of culverts with fish-passable structures.

6. Stream relocation and daylighting activities.

"**Action area**" means all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). As described in the BA at section 1, and restated briefly here, the action area is comprised of a terrestrial area and an aquatic area. The terrestrial area is the project footprint and the area in which construction noise will be audible, estimated to be 1,600 feet from the I-5 corridor. The aquatic component of the action area extends downstream to the mouth of Hylebos Creek, where it drains into the Hylebos Waterway in Commencement Bay. The Puyallup River fall and White River spring populations of PS Chinook salmon and the Puyallup/Carbon River winter populations of PS steelhead are those that are most likely to be affected by the proposed action.

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The impacts to listed species or designated critical habitat from federal agency activities or existing federal agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02). We incorporate by reference section 3 of the BA, titled Environmental Setting to describe the environmental baseline and that is being adopted here.

The headwaters portion of the Hylebos Creek watershed supports PS Chinook salmon and PS steelhead. The headwaters of Hylebos Creek flow intermittently. Channel modifications, including culverts, have been installed that block fish access so that Chinook salmon and steelhead passage is stopped 1.5 miles downstream from the project site. Critical habitat has been designated in Hylebos Creek but not as far upstream as the project site.

Status of Species and Critical Habitat

We examined the status of each species that would be adversely affected by the proposed action to inform the description of the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. We also examined the condition of critical habitat downstream of the site for the proposal and considered the function of the physical or biological features essential to the conservation of the species that create the conservation value of that habitat. BA section 2, pages 40 through 52 provides a status of species and critical habitat. We supplement the BA with NMFS' most recent information on status of species and critical habitat, including the influence of climate on each.

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential physical and biological features that help to form that conservation value.

One factor affecting the status of ESA-listed species considered in this opinion, and aquatic habitat at large, is climate change. Climate change is likely to play an increasingly important role in determining the abundance and distribution of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes will not be spatially homogeneous across the Pacific Northwest. Major ecological realignments are already occurring in response to climate change (IPCC WGII, 2022). Long-term trends in warming have continued at global, national and regional scales. Global surface temperatures in the last decade (2010s) were estimated to be 1.09 °C higher than the 1850-1900 baseline period, with larger increases over land ~1.6 °C compared to oceans ~0.88 (IPCC WGI, 2021). The vast majority of this warming has been attributed to anthropogenic releases of greenhouse gases (IPCC WGI, 2021). Globally, 2014-2018 were the 5 warmest years on record both on land and in the ocean (2018 was the 4th warmest) (NOAA NCEI 2022). Events such as the 2013-2016 marine heatwave (Jacox et al. 2018) have been attributed directly to anthropogenic warming in the annual special issue of Bulletin of the American Meteorological Society on extreme events (Herring et al. 2018). Global warming and anthropogenic loss of biodiversity represent profound threats to ecosystem functionality (IPCC WGII 2022). These two factors are often examined in isolation, but likely have interacting effects on ecosystem function.

Updated projections of climate change are similar to or greater than previous projections (IPCC WGI, 2021). NMFS is increasingly confident in our projections of changes to freshwater and marine systems because every year brings stronger validation of previous predictions in both physical and biological realms. Retaining and restoring habitat complexity, access to climate refuges (both flow and temperature) and improving growth opportunity in both freshwater and marine environments are strongly advocated in the recent literature (Siegel and Crozier 2020).

Climate change is systemic, influencing freshwater, estuarine, and marine conditions. Other systems are also being influenced by changing climatic conditions. Literature reviews on the impacts of climate change on Pacific salmon (Crozier 2015, 2016, 2017, Crozier and Siegel 2018, Siegel and Crozier 2019, 2020) have collected hundreds of papers documenting the major themes relevant for salmon. Here we describe habitat changes relevant to Pacific salmon and steelhead, prior to describing how these changes result in the varied specific mechanisms impacting these species in subsequent sections.

Forests

Climate change will impact forests of the western U.S., which dominate the landscape of many watersheds in the region. Forests are already showing evidence of increased drought severity, forest fire, and insect outbreak (Halofsky et al. 2020). Additionally, climate change will affect tree reproduction, growth, and phenology, which will lead to spatial shifts in vegetation. Halofsky et al. (2018) projected that the largest changes will occur at low- and high-elevation forests, with expansion of low-elevation dry forests and diminishing high-elevation cold forests and subalpine habitats.

Forest fires affect salmon streams by altering sediment load, channel structure, and stream temperature through the removal of canopy. Holden et al. (2018) examined environmental factors contributing to observed increases in the extent of forest fires throughout the western U.S. They found strong correlations between the number of dry-season rainy days and the annual extent of forest fires, as well as a significant decline in the number of dry-season rainy days over the study period (1984-2015). Consequently, predicted decreases in dry-season precipitation, combined with increases in air temperature, will likely contribute to the existing trend toward more extensive and severe forest fires and the continued expansion of fires into higher elevation and wetter forests (Alizedeh 2021).

Agne et al. (2018) reviewed literature on insect outbreaks and other pathogens affecting coastal Douglas-fir forests in the Pacific Northwest and examined how future climate change may influence disturbance ecology. They suggest that Douglas-fir beetle and black stain root disease could become more prevalent with climate change, while other pathogens will be more affected by management practices. Agne et al. (2018) also suggested that due to complex interacting effects of disturbance and disease, climate impacts will differ by region and forest type.

Freshwater Environments

The following is excerpted from Siegel and Crozier (2019), who present a review of recent scientific literature evaluating effects of climate change, describing the projected impacts of climate change on instream flows:

Cooper et al. (2018) examined whether the magnitude of low river flows in the western U.S., which generally occur in September or October, are driven more by summer conditions or the prior winter's precipitation. They found that while low flows were more sensitive to summer evaporative demand than to winter precipitation, interannual variability in winter precipitation was greater. Malek et al. (2018), predicted that summer evapotranspiration is likely to increase in conjunction with declines in snowpack and increased variability in winter precipitation. Their results suggest that low summer flows are likely to become lower, more variable, and less predictable.

The effect of climate change on ground water availability is likely to be uneven. Sridhar et al. (2018) coupled a surface-flow model with a ground-flow model to improve predictions of surface water availability with climate change in the Snake River Basin. Projections using RCP 4.5 and 8.5 emission scenarios suggested an increase in water table heights in downstream areas of the basin and a decrease in upstream areas.

As cited in Siegel and Crozier (2019), Isaak et al. (2018), examined recent trends in stream temperature across the Western U.S. using a large regional dataset. Stream warming trends paralleled changes in air temperature and were pervasive during the low-water warm seasons of 1996-2015 (0.18-0.35°C/decade) and 1976-2015 (0.14-0.27°C/decade). Their results show how continued warming will likely affect the cumulative temperature exposure of migrating sockeye salmon *O. nerka* and the availability of suitable habitat for brown trout *Salmo trutta* and rainbow trout *O. mykiss*. Isaak et al. (2018) concluded that most stream habitats will likely remain suitable for salmonids in the near future, with some becoming too warm. However, in cases where habitat access is currently restricted by dams and other barriers salmon and steelhead will be confined to downstream reaches typically most at risk of rising temperatures unless passage is restored (FitzGerald et al. 2020, Myers et al. 2018).

Streams with intact riparian corridors and that lie in mountainous terrain are likely to be more resilient to changes in air temperature. These areas may provide refuge from climate change for a number of species, including Pacific salmon. Krosby et al. (2018), identified potential stream refugia throughout the Pacific Northwest based on a suite of features thought to reflect the ability of streams to serve as such refuges. Analyzed features include large temperature gradients, high canopy cover, large relative stream width, low exposure to solar radiation, and low levels of human modification. They created an index of refuge potential for all streams in the region, with mountain area streams scoring highest. Flat lowland areas, which commonly contain migration corridors, were generally scored lowest, and thus were prioritized for conservation and restoration. However, forest fires can increase stream temperatures dramatically in short time-spans by removing riparian cover (Koontz et al. 2018), and streams that lose their snowpack with climate change may see the largest increases in stream temperature due to the removal of temperature buffering (Yan et al. 2021). These processes may threaten some habitats that are currently considered refugia.

Marine and Estuarine Environments

Along with warming stream temperatures and concerns about sufficient groundwater to recharge streams, a recent study projects nearly complete loss of existing tidal wetlands along the U.S. West Coast, due to sea level rise (Thorne et al. 2018). California and Oregon showed the greatest threat to tidal wetlands (100%), while 68% of Washington tidal wetlands are expected to be submerged. Coastal development and steep topography prevent horizontal migration of most wetlands, causing the net contraction of this crucial habitat.

Rising ocean temperatures, stratification, ocean acidity, hypoxia, algal toxins, and other oceanographic processes will alter the composition and abundance of a vast array of oceanic species. In particular, there will be dramatic changes in both predators and prey of Pacific salmon, salmon life history traits and relative abundance. Siegel and Crozier (2019) observe that changes in marine temperature are likely to have a number of physiological consequences on fishes themselves. For example, in a study of small planktivorous fish, Gliwicz et al. (2018) found that higher ambient temperatures increased the distance at which fish reacted to prey. Numerous fish species (including many tuna and sharks) demonstrate regional endothermy, which in many cases augments eyesight by warming the retinas. However, Gliwicz et al. (2018) suggest that ambient temperatures can have a similar effect on fish that do not demonstrate this trait. Climate change is likely to reduce the availability of biologically essential omega-3 fatty acids produced by phytoplankton in marine ecosystems. Loss of these lipids may induce cascading trophic effects, with distinct impacts on different species depending on compensatory mechanisms (Gourtay et al. 2018). Reproduction rates of many marine fish species are also likely to be altered with temperature (Veilleux et al. 2018). The ecological consequences of these effects and their interactions add complexity to predictions of climate change impacts in marine ecosystems.

Perhaps the most dramatic change in physical ocean conditions will occur through ocean acidification and deoxygenation. It is unclear how sensitive salmon and steelhead might be to the direct effects of ocean acidification because of their tolerance of a wide pH range in freshwater (although see Ou et al. 2015 and Williams et al. 2019), however, impacts of ocean acidification and hypoxia on sensitive species (e.g., plankton, crabs, rockfish, groundfish) will likely affect salmon indirectly through their interactions as predators and prey. Similarly, increasing frequency and duration of harmful algal blooms may affect salmon directly, depending on the toxin (e.g., saxitoxin vs domoic acid), but will also affect their predators (seabirds and mammals). The full effects of these ecosystem dynamics are not known but will be complex. Within the historical range of climate variability, less suitable conditions for salmonids (e.g., warmer temperatures, lower streamflows) have been associated with detectable declines in many of these listed units, highlighting how sensitive they are to climate drivers (Ford 2022, Lindley et al. 2009, Williams et al. 2016, Ward et al. 2015). In some cases, the combined and potentially additive effects of poorer climate conditions for fish and intense anthropogenic impacts caused the population declines that led to these population groups being listed under the ESA (Crozier et al. 2019).

Climate change effects on salmon and steelhead

In freshwater, year-round increases in stream temperature and changes in flow will affect physiological, behavioral, and demographic processes in salmon, and change the species with which they interact. For example, as stream temperatures increase, many native salmonids face increased competition with more warm-water tolerant invasive species. Changing freshwater temperatures are likely to affect incubation and emergence timing for eggs, and in locations where the greatest warming occurs may affect egg survival, although several factors impact intergravel temperature and oxygen (e.g., groundwater influence) as well as sensitivity of eggs to thermal stress (Crozier et al. 2020). Changes in temperature and flow regimes may alter the amount of habitat and food available for juvenile rearing, and this in turn could lead to a restriction in the distribution of juveniles, further decreasing productivity through density dependence. For migrating adults, predicted changes in freshwater flows and temperatures will likely increase exposure to stressful temperatures for many salmon and steelhead populations, and alter migration travel times and increase thermal stress accumulation for ESUs or DPSs with early-returning (i.e. spring- and summer-run) phenotypes associated with longer freshwater holding times (Crozier et al. 2020, FitzGerald et al. 2020). Rising river temperatures increase the energetic cost of migration and the risk of *en route* or pre-spawning mortality of adults with long freshwater migrations, although populations of some ESA-listed salmon and steelhead may be able to make use of cool-water refuges and run-timing plasticity to reduce thermal exposure (Keefer et al. 2018, Barnett et al. 2020).

Marine survival of salmonids is affected by a complex array of factors including prey abundance, predator interactions, the physical condition of salmon within the marine environment, and carryover effects from the freshwater experience (Holsman et al. 2012, Burke et al. 2013). It is generally accepted that salmon marine survival is size-dependent, and thus larger and faster growing fish are more likely to survive (Gosselin et al. 2021). Furthermore, early arrival timing in the marine environment is generally considered advantageous for populations migrating through the Columbia River. However, the optimal day of arrival varies across years, depending on the seasonal development of productivity in the California Current, which affects prey available to salmon and the risk of predation (Chasco et al. 2021). Siegel and Crozier (2019) point out the concern that for some salmon populations, climate change may drive mismatches between juvenile arrival timing and prey availability in the marine environment. However, phenological diversity can contribute to metapopulation-level resilience by reducing the risk of a complete mismatch. Carr-Harris et al. (2018), explored phenological diversity of marine migration timing in relation to zooplankton prey for sockeye salmon *O. nerka* from the Skeena River of Canada. They found that sockeye migrated over a period of more than 50 days, and populations from higher elevation and further inland streams arrived in the estuary later, with different populations encountering distinct prey fields. Carr-Harris et al. (2018) recommended that managers maintain and augment such life-history diversity.

Synchrony between terrestrial and marine environmental conditions (e.g., coastal upwelling, precipitation and river discharge) has increased in spatial scale causing the highest levels of synchrony in the last 250 years (Black et al. 2018). A more synchronized climate combined with simplified habitats and reduced genetic diversity may be leading to more synchrony in the productivity of populations across the range of salmon (Braun et al. 2016). For example, salmon productivity (recruits/spawner) has also become more synchronized across Chinook populations from Oregon to the Yukon (Dorner et al. 2018, Kilduff et al. 2014). In addition, Chinook salmon have become smaller and younger at maturation across their range (Ohlberger 2018). Other Pacific salmon species (Stachura el al. 2014) and Atlantic salmon (Olmos et al. 2020) also have demonstrated synchrony in productivity across a broad latitudinal range.

At the individual scale, climate impacts on salmon in one life stage generally affect body size or timing in the next life stage and negative impacts can accumulate across multiple life stages (Healey 2011; Wainwright and Weitkamp 2013, Gosselin et al. 2021). Changes in winter precipitation will likely affect incubation and/or rearing stages of most populations. Changes in the intensity of cool season precipitation, snow accumulation, and runoff could influence migration cues for fall, winter and spring adult migrants, such as coho and steelhead. Egg survival rates may suffer from more intense flooding that scours or buries redds. Changes in hydrological regime, such as a shift from mostly snow to more rain, could drive changes in life history, potentially threatening diversity within an ESU (Beechie et al. 2006). Changes in summer temperature and flow will affect both juvenile and adult stages in some populations, especially those with yearling life histories and summer migration patterns (Crozier and Zabel 2006; Crozier et al. 2010, Crozier et al. 2019).

At the population level, the ability of organisms to genetically adapt to climate change depends on how much genetic variation currently exists within salmon populations, as well as how selection on multiple traits interact, and whether those traits are linked genetically. While genetic diversity may help populations respond to climate change, the remaining genetic diversity of many populations is highly reduced compared to historic levels. For example, Johnson et al. (2018), compared genetic variation in Chinook salmon from the Columbia River Basin between contemporary and ancient samples. A total of 84 samples determined to be Chinook salmon were collected from vertebrae found in ancient middens and compared to 379 contemporary samples. Results suggest a decline in genetic diversity, as demonstrated by a loss of mitochondrial haplotypes as well as reductions in haplotype and nucleotide diversity. Genetic losses in this comparison appeared larger for Chinook from the mid-Columbia than those from the Snake River Basin. In addition to other stressors, modified habitats and flow regimes may create unnatural selection pressures that reduce the diversity of functional behaviors (Sturrock et al. 2020). Managing to conserve and augment existing genetic diversity may be increasingly important with more extreme environmental change (Anderson et al. 2015), though the low levels of remaining diversity present challenges to this effort (Freshwater 2019). Salmon historically maintained relatively consistent returns across variation in annual weather through the portfolio effect (Schindler et al. 2015), in which different populations are sensitive to different climate drivers. Applying this concept to climate change, Anderson et al (2015) emphasized the additional need for populations with different physiological tolerances. Loss of the portfolio increases volatility in fisheries, as well as ecological systems, as demonstrated for Fraser River and Sacramento River stock complexes (Freshwater et al. 2019, Munsch et al. 2022).

Table 1, below provides a summary of listing and recovery plan information, status summaries and limiting factors for the species addressed in this opinion. More information can be found in recovery plans and status reviews for these species. Acronyms appearing in the table include DPS (Distinct Population Segment), ESU (Evolutionarily Significant Unit), ICTRT (Interior Columbia Technical Recovery Team), MPG (Multiple Population Grouping), NWFSC (Northwest Fisheries Science Center), TRT (Technical Recovery Team), and VSP (Viable Salmonid Population).

Status of the Critical Habitat This section describes the status of designated critical habitat affected by the proposed action by examining the condition and trends of the essential physical and biological features of that habitat throughout the designated areas. These features are essential to the conservation of the ESA-listed species because they support one or more of the species' life stages (e.g., sites with conditions that support spawning, rearing, migration and foraging). A summary of the status of critical habitats, considered in this opinion, is provided in Table 2.

For most salmon and steelhead, NMFS's critical habitat analytical review teams (CHARTs) ranked watersheds within designated critical habitat at the scale of the fifth-field hydrologic unit code (HUC5) in terms of the conservation value they provide to each ESA-listed species that they support (NMFS 2005). The conservation rankings were high, medium, or low. To determine the conservation value of each watershed to species viability, the CHARTs evaluated the quantity and quality of habitat features, the relationship of the area compared to other areas within the species' range, and the significance to the species of the population occupying that area. Even if a location had poor habitat quality, it could be ranked with a high conservation value if it were essential due to factors such as limited availability, a unique contribution of the population it served, or is serving another important roll.

Table 1. Listing classification and date, recovery plan reference, most recent status review, status summary, and limiting factors for each species considered in this opinion.

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Puget Sound Chinook salmon	Threatened 6/28/05 (70 FR 37159)	Shared Strategy for Puget Sound 2007 NMFS 2006	NMFS 2016; Ford 2022	This ESU comprises 22 populations distributed over five geographic areas. All Puget Sound Chinook salmon populations continue to remain well below the TRT planning ranges for recovery escapement levels. Most populations also remain consistently below the spawner–recruit levels identified by the TRT as necessary for recovery. Across the ESU, most populations have increased somewhat in abundance since the last status review in 2016, but have small negative trends over the past 15 years. Productivity remains low in most populations. Overall, the Puget Sound Chinook salmon ESU remains at “moderate” risk of extinction.	• Degraded floodplain and in-river channel structure • Degraded estuarine conditions and loss of estuarine habitat • Degraded riparian areas and loss of in-river large woody debris • Excessive fine-grained sediment in spawning gravel • Degraded water quality and temperature • Degraded nearshore conditions • Impaired passage for migrating fish • Severely altered flow regime
Puget Sound steelhead	Threatened 5/11/07	NMFS 2019	NMFS 2016; Ford 2022	This DPS comprises 32 populations. Viability of has improved somewhat since the PSTRT concluded that the DPS was at very low viability, as were all three of its constituent MPGs, and many of its 32 DIPs (Hard et al. 2015). Increases in spawner abundance were observed in a number of populations over the last five years within the Central & South Puget Sound and the Hood Canal & Strait of Juan de Fuca MPGs, primarily among smaller populations. There were also declines for summer- and winter-run populations in the Snohomish River basin. In fact, all summer-run steelhead populations in the Northern Cascades MPG are likely at a very high demographic risk.	• Continued destruction and modification of habitat • Widespread declines in adult abundance despite significant reductions in harvest • Threats to diversity posed by use of two hatchery steelhead stocks • Declining diversity in the DPS, including the uncertain but weak status of summer-run fish • A reduction in spatial structure • Reduced habitat quality • Urbanization • Dikes, hardening of banks with riprap, and channelization

Table 2. Critical habitat, designation date, federal register citation, and status summary for critical habitat considered in this opinion

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Puget Sound Chinook salmon	9/02/05 70 FR 52630	Critical habitat for Puget Sound Chinook salmon includes 1,683 miles of streams, 41 square mile of lakes, and 2,182 miles of nearshore marine habitat in Puget Sounds. The Puget Sound Chinook salmon ESU has 61 freshwater and 19 marine areas within its range. Of the freshwater watersheds, 41 are rated high conservation value, 12 low conservation value, and eight received a medium rating. Of the marine areas, all 19 are ranked with high conservation value.
Puget Sound steelhead	2/24/16 81 FR 9252	Critical habitat for Puget Sound steelhead includes 2,031 stream miles. Nearshore and offshore marine waters were not designated for this species. There are 66 watersheds within the range of this DPS. Nine watersheds received a low conservation value rating, 16 received a medium rating, and 41 received a high rating to the DPS.

Effects of the Action: Under the ESA, “effects of the action” are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action.

We adopt by reference section 4 of the BA describing the effects of the action. The BA provides a detailed discussion and comprehensive assessment of the effects of the proposed action in section 4 of the initiation package, and is adopted here (50 CFR 402.14(h)(3)). NMFS has evaluated this section and after our independent, science-based evaluation determined it meets our regulatory and scientific standards. A simplified list of the effects are:

1) Stormwater discharges
The proposed action largely entails redeveloping existing residential and commercial properties. The existing pollution-generating impervious surfaces on the site for the proposal are 24.20 acres. Post construction, this will increase by 1.27 acres to 25.47 acres. Sound Transit applied the Western Washington Hydrology Model, Version 3.0, to analyze project hydrology and to determine sizing of the stormwater facilities. The conceptual design for stormwater facilities provides best management practices (BMPs) for all new post-project impervious surfaces. The preliminary design will include stormwater treatment facilities large enough to accommodate treatment for all post-project impervious surfaces. Proposed facilities will include detention ponds, detention vaults, and guideway dispersion. Water quality will be treated to enhanced treatment standards (intended to provide a higher rate of removal of dissolved metals than basic treatment). Detention facilities have been designed to achieve post-project stormwater flows equivalent to forested conditions, as required by Ecology. Most treated and retained stormwater is expected to be discharged to existing city drainage facilities. There will be new outfalls to Hylebos Creek.

Contaminants in stormwater discharged from the site for the proposal is likely to adversely affect Puget Sound Chinook salmon, Puget Sound steelhead, and the designated critical habitat for each. While the proposed treatment is planned to comply with state and local stormwater management standards, the discharge may still contain levels of contaminants known to cause problems for several species of Pacific salmon, even at extremely low concentrations. In particular NMFS is concerned about 6PPD and 6PPDQ. Puget Sound Chinook salmon and Puget Sound steelhead are both affected by 6PPD in stormwater. It is uncertain that sufficient removal will result from the proposed measures to manage stormwater. Water quality, a PBF of critical habitat will be incrementally degraded, despite treatment. Exposed Puget Sound Chinook salmon and Puget Sound steelhead are likely to experience sublethal health consequences. Other chemicals are also likely to be present in treated stormwater, such as metals and PAHs. These also can cause behavioral and sublethal health effects impairing growth, fitness, or survival of exposed individuals.

2) Construction related noise and turbidity
Planned construction activities include roadway improvements, replacing culverts with fish-passable structures, stream relocation, and stream daylighting. These are planned upstream of

habitat currently accessible to listed species and upstream of designated critical habitats. BMPs will limit the potential for downstream effects. Noise and turbidity from suspended sediment are unlikely to be detected downstream where the designation of critical habitat begins, supporting freshwater rearing and migration. Some fish are likely to be exposed to turbid conditions downstream of the site, due to life history behavior that includes a long freshwater rearing period. The exposed fish are most likely to engage in avoidance behavior as a response.

3) Impermeable surface and hydrology effects.
Of these, only stormwater is likely to have effects that transfer downstream far enough to reach designated critical habitat and to expose listed Puget Sound Chinook salmon and Puget Sound steelhead. Construction-related effects (such as noise and turbidity), are not expected to co-occur with listed species or designated critical habitats because the construction will take place more than a mile from where salmonids have access. Erosion and sediment control measures will be used to avoid construction-related water quality impacts. Because the proposed action entails redeveloping an already developed site, with only approximately 1.27 acre of new impervious surface, no appreciable change in hydrology (either to subsurface movement of water, or to volume and velocity of discharge to surface water) is anticipated. Water conveyance channels on and near the site are small and confined so no avulsion or change is flow path is expected. Again, this location is far enough above the designated area 1.5 miles that any changes to these aspects of habitat would not be discernible within the designated area. Some fish may be exposed to these slight changes but we anticipate no behavioral response or reductions in fitness.

NMFS supplements the BA by providing an evaluation of the indirect effects of the proposed action, which are intended to include a reduced rate of increase in area vehicular traffic. This effort is reasonably likely to slightly slow expected increases in tirewear particle contribution to stormwater. This would assist in preserving current water quality within critical habitat of regional streams, and promoting health and fitness of juvenile salmonids in those streams.

"**Cumulative effects**" are those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation (50 CFR 402.02 and 402.17(a)). Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Section 4.5 of the BA describes the cumulative effects and that section is incorporated by reference here. With future replacement of culverts, steelhead are expected to have access to the site. Extensive work is underway to remove culverts that block fish migration and listed species may have access to the site in the future. This future access is addressed in the BA on pages 14, 37, and 46.

The **Integration and Synthesis** section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action to the environmental baseline and the cumulative effects, taking into account the status of the species and critical habitat, to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species. The potential for adverse effects from the proposed action are limited by the following three observations.

Here both species' status is threatened. This status is based on reduced abundance and productivity, spatial structure, and diversity of the species. These declines are due in part to degraded habitat conditions throughout their geographic range, including multiple factors for decline and limiting factors such as, blocked access to historically available spawning, reduced habitat complexity and available stream miles through diking, draining, fill, and development that preclude off channel habitat access, and poor water quality and riparian conditions. The baseline reflects several of these factors. To this we add the effects of the proposed action.

Stormwater will be treated to comply with current regulatory standards, which will limit but not eliminate the potential for contaminants in stormwater. Effects are a chronic but incremental reduction in the water quality PBF of both salmonid's designated critical habitat, with a slight reduction in value to survival, growth, and fitness among some of the exposed individuals from each successive cohort of the exposed populations for the foreseeable future. However, the primary objective of the proposed action is to create additional commuting options that can slow the rate growth in vehicular traffic, and this is expected to provide a long-term increment of "protective" outcome to area streams by minimizing the source of future contribution of tirewear particles and the water quality impact of 6PPDQ. We consider the effects of the proposed action, both from construction and operation, when added to the baseline, and in consideration of the status of critical habitat, will be slightly negative to the PBF but insufficient to appreciably reduce the conservation value of the critical habitat.

As described above, Chinook salmon and steelhead exposed to stormwater runoff are most likely to have sublethal responses, that could ultimately result in earlier mortality than would occur in more fit fish. However, the proposed action's increment of take, when added to the baseline, and considering the status of the species, is not large enough to discernibly alter current abundance and productivity and therefore is unlikely to reduce the survival and recovery of a listed species or appreciably diminish the value of designated or proposed critical habitat.

Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of Puget Sound Chinook or Puget Sound steelhead, or destroy or adversely modify their designated critical habitats.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Harass" is further defined by interim guidance as to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering." "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

Amount or Extent of Take

In this biological opinion, NMFS determined that incidental take is reasonably certain to occur in the form of harm, as a result of exposure to contaminants in stormwater runoff, including to 6PPD and 6PPDQ.

Because the presence of listed fish in any given water body is highly variable over time, it is impossible to quantify take in terms of a number of fish exposed over time, and because harm can be expressed as poor fitness that is hard to observe, it is impossible to monitor conditions for when a numeric amount of take could be exceeded. In such circumstances, the Services provides an "extent of take" which is based on an observable aspect of the proposed action causally related to the harm. In this case the extent of take 25.47 acres of impervious area (~24 acres of existing and ~1 acre of new). This extent is easily observable, and is causally related to the source of harm, as a larger impervious area would contribute more stormwater runoff and that increased volume would increase the area affected and increase load of contaminants, exposing more individuals of the listed species.

Monitoring, as described in the terms and conditions below, is required. Reinitiation shall be triggered if 6PPD is detected at levels that exceed those known to have lethal or sublethal effects to Chinook or steelhead.

Effect of the Take

In this biological opinion NMFS determined the proposed action is not likely to result in jeopardy to the species or cause destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures

"Reasonable and prudent measures" (RPMs) are measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

RPM 1. Minimize take from of stormwater discharge.

RPM 2. Monitor and report post-construction conditions indicating that metrics for take are not exceeded.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. The Federal Transit Administration or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following terms and conditions implement reasonable and prudent measure 1:
    a. Incorporate enhanced stormwater treatment, choosing a method or methods with a high rating from Appendix 4-1 in the Washington State Department of Ecology's Stormwater Treatment of Tire Contaminants Best Management Practices Effectiveness (2022)
    b. Ensure that if any effectiveness monitoring from the Washington Department of Ecology Stormwater Action Monitoring collective that reveals the need for a more stringent maintenance protocol, such protocol will be adopted for the enhanced treatment method

2. The following terms and conditions implement reasonable and prudent measure 2:
    a. The report will be provided within 60 days of project completion, and shall indicate the final amount of new impervious surface (in square footage)
    b. The selected method of enhanced treatment
    c. The maintenance frequency of the selected treatment method
    d. Provide the post project report to PROJECTREPORTS.WCR@NOAA.GOV and cc: Phyllis Meyers at Phyllis.Meyers@noaa.gov. Be sure that the regarding line includes the WCRO tracking number WCRO 2023-03230

Reinitiation of Consultation

Under 50 CFR 402.16(a): "Reinitiation of consultation is required and shall be requested by the federal agency or by the Service where discretionary federal agency involvement or control over the action has been retained or is authorized by law and: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action."

NLAA DETERMINATIONS

We reviewed Federal Transit Administration's consultation request document and related materials. Based on our knowledge, expertise, and your action agency's materials, we concur with the action agency's conclusions that the proposed action is not likely to adversely affect the following NMFS ESA-listed species and/or designated critical habitat: PS Chinook salmon, PS Chinook salmon critical habitat, PS steelhead, PS steelhead critical habitat.

ESSENTIAL FISH HABITAT RESPONSE

Thank you also for your request for essential fish habitat (EFH) consultation. NMFS reviewed the proposed action for potential effects on EFH pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation.

Section 305 (b) of the MSA directs federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the associated physical, chemical, and biological properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects may result from actions occurring within EFH or outside of it and may include direct, indirect, site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH (50 CFR 600.0-5(b)).

EFH Affected by the Proposed Action

The proposed project occurs within EFH for various federally managed fish species within the Pacific Coast Salmon Fishery Management Plan. NMFS determined the proposed action would adversely affect EFH, and adopts by reference Appendix A of the BA. Hylebos Creek is included in the EFH designation for Chinook, coho and pink salmon. The impacts of the proposed action on EFH for these species are the same as those addressed in the ESA consultation, above, and water quality reductions from stormwater. Coho are particularly sensitive to 6PPD. Current science indicates that levels as low as 50 nanograms per liter are likely to have detrimental effects on coho.[1].

NMFS determined that the following conservation recommendation is necessary to avoid, minimize, mitigate, or otherwise offsets the impact of the proposed action on EFH.

[1] Scholz, N. January 16, 2024, Personal Commun. Ecotoxicology Program Manager, Northwest Fisheries Science Center, Seattle, WA.

A plan to monitor the concentration of 6PPD in water leaving the site shall be prepared and submitted to NMFS by the end of 2024. This plan will use EPAs selected 6PPD detection method and specify:

a. Sample locations downstream of the project area but upstream of non-project stormwater discharges,
b. Sample frequency and duration,
c. Thresholds for lethal or sublethal effects to coho based on current scientific information, and
d. Additional treatment that will be implemented in a timely manner if those thresholds are exceeded.

Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the federal Transit Administration must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the federal agency have agreed to use alternative time frames for the federal agency response. The response must include a description of the measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

Supplemental Consultation

The Federal Transit Administration must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR 600. 920(l)).

Data Quality Act: This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The biological opinion will be available through NOAA Institutional Repository. A complete record of this consultation is on file at the Oregon and Washington Coastal Office.

Please direct questions regarding this letter to Phyllis Meyers, Central Puget Sound Branch, in Lacey Washington, at phyllis.meyers@noaa.gov or 360-200-8662.

Sincerely,

Kim W. Kratz, Ph.D
Assistant Regional Administrator
Oregon Washington Coastal Office

cc: Ellie Ziegler, Sound Transit
Teresa Vanderburg, Sound Transit

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